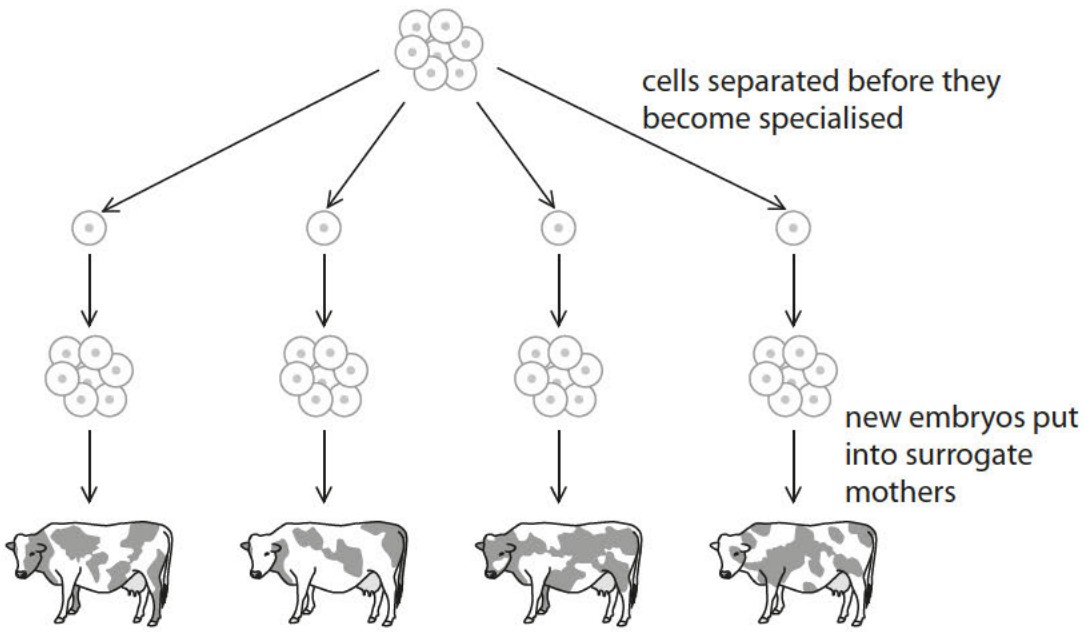
1 Farmers have used selective breeding to produce cows that give high milk yields.

(a) Describe how selective breeding can be used to produce cattle that give high milk yields.

(3)

(b) The diagram shows a different way to obtain cows that produce high milk yields. The process is called embryo cloning.

In this process individual cells from an embryo known to have the potential to become a high milk yielding cow are separated before they become specialised. Each separated cell is then allowed to develop into a new embryo. These new embryos are then put into surrogate mothers.



(i) Where in the body of the surrogate mothers do the new embryos develop?

(1)

.....

(ii) Suggest three advantages of producing cows with desirable characteristics using embryo cloning rather than using selective breeding.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(c) Explain what is meant by the term **clone**.

(2)

.....

.....

(d) Name the type of cell division that produces an embryo from an individual cell.

(1)

.....

(Total for Question = 10 marks)

2 (a) Describe the stages that are used to genetically modify a bacterium that is able to manufacture human growth hormone.

(5)

(b) BST is a hormone that increases milk yield in cows.

(i) Explain what is meant by the term **hormone**.

(2)

(ii) In some countries BST from genetically modified bacteria has been injected into cows to improve milk production.

In other countries selective breeding has been used to improve milk production.

Describe how selective breeding could be used to increase milk production.

(3)

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(Total for Question = 10 marks)

3 (a) Crop plants have been developed by a process called selective breeding.

(i) Describe the process of **selective breeding**.

(4)

(ii) Give **one** example of a desired characteristic developed by selective breeding in a **named** crop plant.

(2)

desired characteristic .....

crop plant .....

(b) Give **two** ways in which natural selection differs from selective breeding.

(2)

1 .....

.....

2 .....

.....

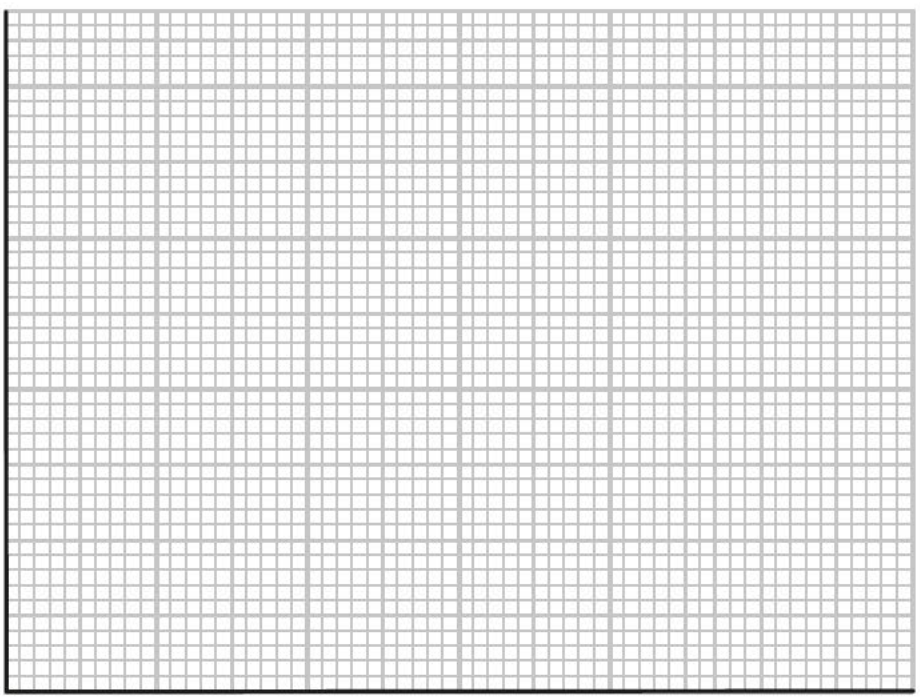
(Total for Question = 8 marks)

4 The table describes four different geographical regions. It also gives the amount of energy converted into plant biomass each year in each region.

Region	Description of region	Energy converted into plant biomass in kJ per m^2 per year
A	woodland in the UK	26 000
B	tropical forest in Indonesia	40 000
C	grassland in the UK	15 000
D	farmed land in the UK	30 000

(a) Plot a bar graph on the grid to show the amount of energy converted into plant biomass each year in each region.

(5)



(b) The amount of energy converted into plant biomass each year depends on the effect that abiotic (non-living) factors have on the rate of photosynthesis.

Carbon dioxide is one of these abiotic factors.

Name three other abiotic factors likely to affect the rate of photosynthesis.

(3)

1 .....

2 .....

3 .....

(c) Regions C and D have the same climate. Plants grown in region D have more energy converted into plant biomass than plants grown in region C. One reason for this is the use of selective breeding to produce high yielding crops.

(i) Suggest two other reasons for more energy being converted into plant biomass in region D.

(2)

1 .....

.....

2 .....

.....

(ii) What is meant by the term **selective breeding**?

(4)

.....

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.....

(d) Describe how you could use a quadrat to estimate the plant biomass in one of the regions.

(4)

(Total for Question = 18 marks)